Contribution ID: **20** Type: **Poster**

Vertical shape determination of a stretched wire from oscillation measurements for alignment applications

The Geodetic Metrology group at CERN use stretched wires as a reference for the position monitoring and alignment of accelerator components. Until now, stretched wires find in particular use as horizontal offset measurement references, since their vertical projection is a line. However, the wire positioning system is able to capture not only the horizontal but also the vertical wire position. In order to use this data as vertical reference of the alignment system, a framework to describe the vertical wire shape is required. This work re-conceptualizes a previously proposed optimization-based algorithm, that recalculates the vertical wire shape via its fundamental frequency from oscillation measurements. As a result, the determination of the vertical shape with respect to a static parabola fitting model was improved one order of magnitude compared to the previously available oscillation-based algorithm. Now, it is possible to determine the wire position with respect to static wire measurements with a precision of the same order of magnitude as the static parabola fitting model for wires of up to 140 m length. Furthermore, the study of wire oscillations revealed methods to localize restrictions of the wire as well as processing options to detect vertical geological movements of the experimental caverns. With these means, information is added to already existing alignment configurations. Besides, future alignment systems can be configured alternatively and provide more redundancy when the vertical position can be also obtained from the wire positioning system with comparable precision.

Author: FLEIG, Luisa (Technische Universitaet Darmstadt (DE))

Co-author: HERTY, Andreas (CERN)

Presenter: FLEIG, Luisa (Technische Universitaet Darmstadt (DE))

Track Classification: Instrumentation